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AUTHOR Ritterbush, Philip C.
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ABSTRACT

The aims of the 1970 Environmental Education Act are examined and the resultant developments of this legislation are reviewed. Detailed are various methods for fulfilling the aims of environmental education. (SB)

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MOVING AHEAD IN ENVIRONMENTAL EDUCATION

Philip C. Ritterbush

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SE 031 003

ENVIRONMENTAL EDUCATION IN CONTEXT: UNDERSTANDING THE SYSTEMS ECOLOGY OF INDUSTRIAL SOCIETY

In the recent affairs of the nation, environment appears as a ground over which opinions divide. Concern for the natural environment seems opposed to the economic imperatives of industrial society. Environmental protection has been criticized as an unwelcome complication of economic development, on grounds that it adds years to the time required to complete public works and imposes burdens of regulation on business that threaten our competitiveness in world markets. On the other hand, economic development activities have been criticized as harmful to the environment. This dichotomy, however, has been observed by many to be a false one. The principles that govern nature--the ecology of nature--also define, to a significant degree, the nature of human society and its options for achieving a state of well-being, for successfully performing its economic functions. The ecosystem is the economy of nature. The economy is the ecosystem of human civilization. The two are inextricably intertwined.

Environmental education aims to improve our understanding of the natural and social support systems as an interactive, interdependent whole. Systems as a whole tend to be invisible to the people they serve and therefore rarely make news. Similarly, the normal functions of interaction between the

natural and social support systems or between their respective subsystems tend to be invisible. But it is the normal functions of these interactions --meeting demand, increasing efficiency, maintaining and improving quality, planning or investing for the future--that are the central concern of environmental education.

Understanding the options, constraints, opportunities, and costs related to the use and functions of these systems will be needed if we are to increase in the future our ability to resolve the issues that emerge from our need for effectively functioning social and natural support systems. It is not a question of "either, or." Both must be maintained if humankind is to survive. Environmental education attempts to provide these understandings.

The sentimental vein of nature appreciation is entitled to respect as part of our national heritage, but this cannot take the place of knowledge of the interactions between nature and human society. Conversely, those who have been accustomed to regard concern for ecological balance or protection of the natural support system as somehow inimical to economic development, for example, overlook the fundamental interdependence between them. The first scientist to derive a vision of "a vast interstate and foreign commerce" for the United States from an accurate assessment of its natural resources was a Harvard University economic geologist, Nathaniel Shaler. In his remarkable treatise, Man and Nature in America (1897), he wrote that an understanding of the environment must guide the design of economic growth. "With the growth of each of these elements of civilization; the arts of the household, of war, and of trade, the chains which bind man to the earth become even stronger. It is impossible to depict in an adequate way the dependence of our modern civilized man upon the

world about him."

Difficult or not, students are beginning to learn about the interdependencies and interactions between human society and its natural support system. On the day you read this it is likely that a school group has visited the power plant that lights your room. Their visit is part of a course on the economic, health, and natural resource costs and benefits of direct and indirect uses of energy in food production. Among other things, they are tracing the energy inputs from fossil fuels in this process and have learned that even the electric power used by your community is derived from fossil fuels.

The laws of the science of energy apply with equal force to living metabolism, to work in all its forms, to engines and their fuels, to lakes and meadows, to insect colonies and electric power systems. In many schools students are comparing the energy content of fertilizers, foodstuffs, forest industry byproducts, human wastes, fossil fuels, and alternative power sources in process budgets for agriculture, manufacturing and transportation. Homework exercises involve youngsters in calculating the fuel savings from domestic insulation, industrial cogeneration of power, and automotive innovations. These youngsters are beginning to think about energy systems in terms of operating efficiencies, fuel requirements, and external environmental impacts.

It is the natural community of organisms sustained in any given stream that enables it to purify human wastes. A good number of tomorrow's citizens have counted the densities of these organisms in nearby streams, projected future community population growth based on hypothetical economic development plans for the area, and are learning how to assess the probable impacts of population growth on the waste treatment facility.

Student "representatives" of consumer groups, regulatory bodies, banks, and legislators are earnestly discussing the future shape of the economic infrastructure of their region. Others are developing alternative transportation plans for their city and are identifying the possible impacts of the plans on the air and water quality, land use patterns, and health, economic, and social needs of the city.

Activities such as these have been found to be among the undertakings of projects funded through the federal Office of Environmental Education in a study conducted by a consortium under a contract with the University of Virginia. In these projects, students are beginning to study, as interrelated wholes, processes that generally are perceived and treated in a fragmented way.

The purpose of such environmental education is not to second-guess the decisions being taken by the community now, but to foster a balanced awareness of factors constituting a network of interactions among humans, their social systems, and the total physical and biological environment so that future decisions may be more wisely appraised and more soundly executed.

While much remains to be done to improve student learning opportunities in environmental education and to better assist teachers who strive to engender this "holistic" understanding, progress is being made.

In the classroom an energy facility proposal is likely to be regarded in a regional context where benefits and risks can be expressed in comparable terms so that views do not become too strongly opposed to be reconciled. Innovative methods for studying and resolving issues can be practiced in the classroom, for later transfer into the informal education sector and into public settings.

The regional awareness that permits the integration of watersheds and transportation networks into a conceptual framework for thought also serves as a ground for the comparison of health risks with development gains so as to engender an awareness that natural resources and social facilities are complementary features in encompassing patterns.

The art of understanding human settlements traces relations among support systems or networks, the built environment of "shells" for social activities and shelter, social performance, human satisfactions, and the natural environment.

Someday it may become necessary to replace the waste treatment plant in these students' community, to consider expansion of their local utility's power generation capability, or to develop a new economic development plan for their region. The process of obtaining public approval will be less likely to take the form of a pitched battle. It is likely instead that alternative proposals will be reviewed thoughtfully in a public manner. Instead of being divided by issues, the community will be more likely to achieve a consensus in favor of an approach or method that is most responsive to the needs and constraints of both the social and natural support systems of the community and region.

Ground divided by the issues of today is being sown with seeds of awareness and knowledge to yield a harvest of understanding for citizenship tomorrow.

SETTING THE AIMS OF ENVIRONMENTAL EDUCATION

In 1970 Congress enacted the Environmental Education Act out of a recognition that democratic political institutions could not function properly unless society's relations with the environment were more widely and fully understood. The Act defines environmental education as "the educational process dealing with man's relationship with his natural and man-made surroundings, and includes the relation of population, pollution, resource allocation and depletion, conservation, transportation, technology, economic impact, and urban and rural planning to the total human environment." It authorized a program of grant and contract support for curricula "in the preservation and enhancement of environmental equality and ecological balance." Support was to be provided for programs in elementary and secondary schools.

Teacher training and other means of professional development were to be made available to government employees, and business, labor, and industrial leaders and employees. Outdoor ecological study centers were to be planned and materials suitable for broadcast use in the mass media were to be developed, as were "community education programs on environmental quality, including special programs for adults."

Appropriations for the first full fiscal year were authorized at $5 million, and $15 and $25 million, respectively, for the years following.

Two Congressional aides who participated in the passage of the legislation later wrote a book about the Act in which they characterized the approach the authors of the bill hoped would eventuate in the schools. "That process was action-oriented and it envisioned increasing environmental awareness and providing the skills, knowledge, and motivation required to solve

environmental problems."*

Four years after passage of the Act, a team of reviewers from the Arizona State University criticized environmental education, in practice, as being too narrow in approach and orientation. They found that there had been a "failure at all levels of education to achieve a truly integrative treatment of the relationships between man and his natural and manmade surroundings."**

The principal recommendation of the study was "to develop core themes and a conceptual structure in environmental education that synthesizes and integrates pertinent subject matter across and between a variety of traditional disciplines." This study recognized the difficulty of realizing the aims of the Environmental Education Act in an educational system built around individual subjects individually taught in individual classrooms. As work under the Act continued in succeeding years, more effective approaches might emerge from experience gained at the community level. The difficulties of pursuing the Act's encompassing aims through normal operating structures of education were also apparent in administration at the federal level, where $3.5 million remained the maximum available for the direct purposes of the Act in any fiscal year.

Looking toward the tenth anniversary of the legislation, the Office of Environmental Education provided for another review. An Environmental Education Project was established in the Research Laboratories for Engineering Sciences at the University of Virginia.

*D. W. Brezina and A. Overmyer, Congress in Action: The Environmental Education Act, Free Press, New York, 1974.
**"Environment-Based Environmental Education: Inventory, Analysis, and Recommendations", Final Report on Contract No. OEC-74-8739, 30 June, 1975.

The curricula and programs funded by the Office were reviewed. Digests were prepared to improve access to these materials by educators.*

The purpose of the UVA project was not competitive evaluation of hundreds of classroom and community efforts. This would have necessitated comparison of many different kinds of environmental and educational situations across an entire nation. Instead the UVA consortium sought to distill from this wide-ranging educational experience a set of goals and a set of designs for processes whereby the goals could be met.

Their study aimed to determine what kinds of processes will best enable a complex industrial society to prepare its citizens to participate in an informed and responsible way in the resolution of the environmental issues of today, and to contribute to an improved quality of life in the future.

When the Environmental Education Act was proposed, several educational officials pointed out that the schools were already treating many aspects of the human environment in social studies and natural science classes. Without question, most of the information which students acquire about the natural- and the man-made-environment must come through instruction on the pattern that now prevails in the nation's schools, as must their basic skills in learning.

But the premise of the Environmental Education Act was that the choices facing our society required a new dimension in citizenship, going beyond the normal terms of political debate. The environment, as some civic leaders were rather ahead of many educators in perceiving, posed choices not merely about what actions citizens should expect of government, whether local or national, but how they could participate more knowledgeably and responsibly in the illumination of issues and in the choice of options. How could they become more

* See the Appendix for a summary of the reports from this project.

knowledgeable about energy systems and the relative costs and benefits of their development and use? How could they acquire an image of the human settlement pattern as a connected whole, and its implications for the social and natural support systems? How could they fulfill individual responsibilities of trusteeship for future generations?

Community representatives who participated in environmental education projects have indicated that issues concerning them could not be properly understood unless students could learn, in the schools, methods whereby choices confronting the society could be examined systematically and brought to the point of informed decision.

The program authorized by the Act was one of innovation in the scope of instruction, functional linkage between ecological and social analysis, and experiments with curricular approaches encompassing the full range of environmental relationships. The fact that proposals for such undertakings have been funded and successfully implemented in school systems and communities can be cited as proof that the approach which the Act sought to encourage is one that has been found acceptable to educational as well as civic interests throughout the country.

The UVA study provided considerable definition of environmental education in a way that lends itself to assessment of local and regional progress. Four characteristics of success were identified. The first is awareness of the manifold environmental factors that make the human relationship with the environment one of mutual dependence for health and well being. The second is the ability to seek and attain a balance among the social, economic, and biological elements of human environmental interactions. The third is knowledge of the environment as related to social, technical, and natural systems in

normal function and when perturbed. The fourth characteristic recognized in the study is enhancement of decision-making as it relates to important issues affecting the future of the society.

The Environmental Education Act has been interpreted as affording support so that the nation's schools can enhance these four characteristics. The UVA study encourages school systems to assess their present performance on the basis of these. The specific terms of environmental policy and social need that constitute local and regional goals will figure in any such assessments. Educational programs already fulfilling these aims are only of general interest to the Office of Environmental Education, as it is not primarily a review body. Where gains in the performance of social support systems remain to be realized through learning about human settlements and technology in the environmental setting in which they function, the Federal Government should continue to provide resources to do that job and place them at the disposal of communities and their schools. The eventual result, recommended in one of the UVA study reports, should be "the broad and complete institutionalization of environmental education throughout the nation."

The UVA study recommends a process for the development of environmental education programs to enlist diverse elements of an educational system in the community setting. This would include elements from the formal and the informal education sectors. A series of steps was envisioned that could be regarded as a model for cumulative changes in the educational enterprise. It was advocated that different sites and units of instruction be recognized as elements of a "learning system design" which can gradually be refined, either in practice or through periodic review. Local initiative is stressed as the primary key to success.

The design should accomplish an infusion of ideas and methods into education so that social and individual learning result and effects can be measured through better decisions in society's interest. Activities at field study centers or other learning sites can be assessed for the part they play in the design, and future plans for the region should enter the formal education process as elements to be explored. The design should present options for the development of environmental education activities in terms of an options profile (described in detail in one of the project reports), in which choices about future directions become clearly visible to educators and civic interests.

A central accomplishment of the UVA study was to articulate a structural model for environmental education with seven "cells" into which desired learning outcomes and all specified activities carried out under the Act could be entered. While these activities serve individually to train teachers or result in understanding of human-environment interactions, they reflect, collectively, progress within the school system, community, or region, toward capabilities desired for environmental education on a continuing basis.

A central difficulty in meeting the aims of environmental education has been that the context in which benefits of awareness and understanding are sought is at least as large as the social, economic, and ecological future of a region. Few projects have been fully regional in scope, and these tended to be more oriented toward the present than to the future. The majority of past projects reviewed focused on matters related to single issues as manifested in a single locale, a small part of a geographic entirety. Many educators rightly insist on treating those local or functional aspects that students can see at first hand, or about which they are best prepared to learn in the classroom. In order to be as educationally effective as they can be in the present, teachers and auxiliary persons disengage from the holistic and regional dimensions needed for optimal goal achievement.

The UVA study, in its descriptive analysis of environmental education, made visible the difficulty just cited. How could teachers working in particular subjects or community representatives concerned with some one issue enlarge the educational scope, while continuing to provide effective educational services?

FULFILLING THE AIMS OF ENVIRONMENTAL EDUCATION

The need to link individual units of instruction or a single issue with a more embracing context closely resembles a difficulty common in all design practice. The functions of individual components must be improved step by step, while overall performance can be measured only in system terms. The UVA study suggested that approaches to overcoming this diffculty that have been found useful in design practice hold promise in developing learning systems. Institutions that have pioneered in methods for "collective inquiry" that are widely used in other settings were asked to apply such methods to environmental education.

One method that enables people to establish how parts of complex systems are related is called "interpretive structural modeling (ISM)". Innovative methods of idea generation are applied to list as many individual elements as those involved can identify. Following discussion to clarify, to eliminate duplication, and to gain general understanding of the elements, the next step is to consider and select some well-defined relation as it may apply to all possible pairs of items listed. The relation chosen might be "is a partial cause of", so that participants could vote in the exercise according to how they perceive various events to be causally related.

A subject that was considered in this way in one of the project reports was the use of land in the vicinity of urban centers. By subjecting each feature of the issue to a process of assessment in which each person votes after discussion of the relationship involving a given pair of elements, a structure gradually emerges to reflect judgments in the aggregate derived from different special outlooks, such as food production, development concerns, topsoil runoff, and population pressures.

"In the process of deciding whether the relation holds between two elements, the group often develops an improved definition or understanding of the elements or the relation," comments the report on collective inquiry methods. "They also gain a better understanding of other participants' views about the elements or the values, beliefs, or perceptions of other participants. These improved understandings are among the main beneficial outcomes of collective inquiries."

Another procedure, called the "nominal group technique (NGT)", is useful in eliciting individual written answers to questions about specific components. It relies on facilitated discussion to identify interrelationships, followed by anonymous voting to achieve shared judgment.

One of the collective inquiry techniques reviewed for its utility in environmental education was the "charrette", a group design procedure often used in architecture. The study discussed a charrette employed to plan land use in the Shawnee National Forest in Illinois. In Columbus, Ohio, the Battelle Memorial Institute and A. T. and T. collaborated in an assessment of community expectations for the public school curriculum that involved 1,700 people. The study also commissioned a trial of a variety of the collective inquiry methods on a range of environmental issues within the Tennessee Valley Authority region, and evaluation disclosed that they were highly rated for contributing to solutions of concrete problems in planning and decision making.

"Learning about one's environment encompasses a large number of factors," the study reported. "Understanding all these factors, their interrelations, and their implications for managing the future cannot be done alone. Involvement in collective inquiries with other participants with a variety of skills, knowledge, experiences, perceptions, and values is required."

A belief that technology and environmental quality are at odds with each other has contributed to the impression that environmental issues remain impossible to resolve. The educational counterpart to this impression is that while the schools can teach the appreciation of nature or can confer an understanding of the complexities of our industrial society, they cannot integrate the two forms of knowledge.

The University of Dayton, the University of Illinois, the University of Northern Iowa, Vanderbilt University, as well as the Far West Laboratory for Educational Research and Development and other collaborators with the University of Virginia in the environmental education study have demonstrated that collective inquiry methods may serve communities in formulating designs for environmental education. Where the separate emphases of fields of study have tended to fragment the educational enterprise, the interrelationships througout the human-environment complex may exert an integrating influence in discussions among community representatives, environmental groups, industrialists, and educators.

The principal process recommendation of the study is that collective inquiry methods be instituted at the community level. Where communities and school systems have been impeded by differences in outlook and approach among different educational fields or differences among the professional functions of segments of the community, group processes using the collective inquiry methods are recommended as powerful learning means, helping to maintain progress toward better integrated programs in the future.

The overall conception of environmental education provides for a system perspective. There are seven cells in the structure. (1) Planning is accompanied by the development of (2) delivery systems and support. Both contribute to (3) learning system design. (4) Personnel development may be necessary as a preliminary to (5) the learning activities that occur, leading to (6) learning outcomes. All feed into the judgmental process of (7) evaluation, which also feeds back into (1) planning.

A regional framework can be chosen because it is the focus for decision, because most social support systems are regional in scope, or because ecologists and geographers are accustomed to analyze inter-

actions on a regional basis. "A 'region', in our design concept," comments one of the study reports, "is defined as the largest territory of common concern of a functioning pattern of human settlements which has the greatest opportunity to match problems and potentials with resources--whether or not there is presently a unified regional government. A regional perspective strengthens the opportunity to consider the long-range impacts of current actions; match the scale of the decision process to the scale of the problems; create integrated solutions to problems such as transportation, housing, water, waste disposal, energy, and land use; consider the social and economic impacts of changing the physical environment; provide for feedback from citizens to other policymakers; and to make appropriate use of science and technology."

Given that the major natural geographic regions of the country are ecologically distinct, by virtue of climatic and resource differences, they can serve as frames of reference within which to develop the model recommended in the study. One of the benefits of doing so would be ready transferability of instructional resources within each region, where agriculture, aquatic and marine biology, land use and water quality, and other matters affected by climate are fairly uniform.

Since many environmental issues are resolved by assigning different weights to variables, solutions might be general within any one region. Participants in the study looked upon regions as helpful contexts for evaluations of educational accomplishment. The Office of Environmental Education could support the development of instructional materials suitable for use within each region by encouraging proposals from school systems, universities, community groups, and professional organizations. Adoption and use of the materials elsewhere in the region would remain subject to local option. Regional resource centers and regional meetings would afford opportunities to share and assess mutual interests and achievements.

The recommendations in favor of regional environmental learning systems reflect a judgment that widely used design procedures make it feasible to develop programs in this way. One of the most

significant aspects of the procedures recommended is their readiness for implementation. Workability and effectiveness of the approaches are emphasized. Underlying every workable design is a body of compatible knowledge brought to the design by the participants, through the local initiative process. "It is clear that design has not been a significant concern in educational research and development," the study observes. Using best available knowledge, and building upon the realities of present systems are standard practices in professional approaches to design which many efforts to introduce innovations into education have disregarded. So is follow-up, "for infusing the design in a region and ... for evaluating the design once it is in place."

Considerable effort is given to the description of graphics to convey understanding of complex system processes without extensive verbal descriptions. Throughout the study imagery was sought that might communicate effectively with community leaders and educational administrators. Communities that do not have their own "map" for environmental education might well diagram their present efforts according to the seven-cell model and decide which areas need to be emphasized more in the future. Collective inquiry methods can serve to translate discourse among educators and civic leaders into designs for regional environmental learning systems.

The Office of Environmental Education has served as a source of support for extensive resource development and trials of instructional programs encompassing the full range of human-environment interactions. A shift toward regional objectives requiring several years to plan, to develop personnel, to design learning systems, and to create delivery and support systems would require change in the pattern for the administration of support. The study served to encourage consideration of more comprehensive, multi-year projects by the Office and also levels of funding closer to the full authorization set by the Act.

Overcoming the shortcomings that remain in environmental education will require us to surmount a number of institutional and conceptual hurdles.* The study suggests that environmental education could enter a new phase of fruitful service and constructive accomplishment. The best index of the need to continue in this direction is to be found in the number of environmental issues that will perplex men and women in America until we have learned how to resolve them.

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* "The Institutionalization of Environmental Education in the Formal Education Sector: A Generic Model," Product from Grant No. G007802598, September 1979. Far West Laboratory for Educational Research and Development, San Francisco, CA.

APPENDIX

ENVIRONMENTAL EDUCATION
PROGRAM DESIGN RESOURCES

This Appendix is provided by the University of Virginia project staff to serve as a report reference to accompany the paper MOVING AHEAD IN ENVIRONMENTAL EDUCATION, by Philip C. Ritterbush

AN INTRODUCTION TO ENVIRONMENTAL EDUCATION RESOURCES

The University of Virginia Center for Participative System Design, supported by the U. S. Office of Environmental Education, and assisted by several subcontractors, developed a set of environmental education resources. The design and development of these resources were based on a conception of environmental education that is consistent with the Environmental Education Act of 1970 (P. L. 91-516, and subsequent amendments, including P. L. 93-278 and P. L. 59-561), namely that environmental education should:

- o focus on and clarify the complex relationships existing between natural and human systems, and examine the many aspects and interdependencies of both;
- o use information from a variety of fields and disciplines (including the natural sciences, social sciences, and humanities) in order to deal adequately with the ecological, social, aesthetic, economic, technological and cultural dimensions of environmental issues; and
- o emphasize problem-solving and decision-making by presenting real environmental problems or issues that have local, regional, national, or global significance. It should engage learners in values clarification, problem-solving, planning, and decision-making activities that prepare them for dealing with environmental problems and issues that affect individuals and society.

THE TYPES OF RESOURCES

Resources are of several types, suitable for various target audiences. They range from resources for strategic planning for environmental education to mathematics problems suitable for eighth-grade classes.

THE RESOURCES

A. Moving Ahead in Environmental Education

This essay discusses the future of environmental education in a philosophical vein and suggests design approaches for the future of environmental education.

B. Designs for the Future of Environmental Education

This is the final, summary report on the UVA Project. It organizes the results of the study, and connects other project reports to specific topical areas. Some self-paced learning materials are included to provide depth in selected areas.

C. Descriptive Analysis of Environmental Education

This project report presents a basis for a descriptive analysis of environmental education, distinguishes formal and informal environmental education, assesses compatible and mutually supporting roles for formal and non-formal environmental education, compares environmental education with a normative model (see D), and discusses some strategies for change.

This report is primarily for general audiences with other reports furnishing more detail.

D. An Integration of Normative Models for Environmental Education

This project report synthesizes a structure for environmental education consisting of seven major parts: planning, learning systems design, personnel development, learning activities, delivery systems and support, evaluation, and learning outcomes. Each of these parts is structured in detail, to furnish an integrated map of environmental education.

The sources of the map elements are given, and the method of developing the map is explained.

This report should be useful to persons who want to see an overall organizational framework for environmental education.

E. Learner Readiness for Environmental Education

This report, developed under a subcontract to the Far West Laboratory for Educational R&D, reviews the current status of learning and developmental theory, and the connection of this work to curriculum design. The implications of the present state of knowledge for the conduct of environmental education are given.

This report should be valuable to persons concerned with personnel development, curriculum development, and learning system design.

F. Conceptual Basis for the Design of Regional Environmental Learning Systems (RELS)

This report is intended as a thought piece to help illuminate the idea of a "Regional Environmental Learning System". The RELS concept offers a model for how to think about developing environmental education through local initiative.

While this report is oriented toward the general reader, in its later chapters it begins to focus upon learning systems design.

G. Sourcebook for the Design of Regional Environmental Learning Systems (RELS)

This is a report in six volumes. Building on the work reported in C, D, E, and F, which is presumed to have been studied as background, these volumes offer ideas, methods, and initial models for local design and implementation of a RELS.

- Volume 1. Overview. The Overview volume places the Sourcebook in focus, describes the contents of succeeding volumes, discusses major issues in environmental education and proposes responses to them, presents a pyramical set of definitions of environmental education ranging from a "popularized" definition to an elaborate definition set forth in D, and outlines approaches and strategies for carrying out environmental education.

- Volume 2. You Create a Design This volume develops in detail a mission for environmental education, explores the design of a learning system from a political perspective, discusses how conceptual system design can be carried out, and discusses the relation of projects to the Environmental Education Act of 1970.

  The important role of facilitator in learning systems design is described in the Appendix.

  This volume is intended for use by education innovators.

- Volume 3. Creating a Regional Environmental Learning System

  This volume addresses the networking aspects of learning system design, with particular application to informal environmental education. It also is relevant to establishing good linkages between formal and informal environmental education.

- Volume 4. Conducting Collective Inquiry. This volume explores alternative ways of conducting environmental education through an inquiry mode. The inquiry mode of learning is thought to have the greatest promise for environmental education, because of the need to learn through information sharing. Several tested means for conducting collective inquiry are described. Appendices contain full descriptions of computer software that can be used to help facilitate the organization of complex issues. With the aid of a skilled facilitator, this software can be a major aid in learning, as has been demonstrated in numerous settings, including high school.

- Volume 5. Evaluating a Regional Environmental Learning System This volume is primarily for persons who are novices in evaluation, but who

are interested in seeing that evaluation gets done. Various cases are given as examples for focusing and illustrating evaluation ideas and philosophies. Numerous techniques and methods for evaluation are set forth, possible resource persons are identified, and a bibliography is given.

- Volume 6. Content-Oriented Resources
  Two different kinds of problem sets are offered for use in the eight grade mathematics curriculum. These stress environmental issues, and range from very simple problems in arithmetic to more sophisticated structuring problems.

  The use of collective inquiry methods is developed in the context of a thematic approach to the study of human settlements. The materials shown here are illustrative of how environmental education can be developed thematically in the formal system, as a way of preparing persons for effective citizenship in their communities.

H. A Partial History of the Environmental Education Act

This report is a collection of items relating to the history of the Environmental Education Act of 1970. It is thought that this partial history will be of interest to persons who are seeking an understanding of the federal role in environmental education, and a feeling for how the Environmental Education Act has influenced environmental education.

I. Abstracts of Grant Products

Over 700 projects were sponsored under the Environmental Education Act during the years 1971-77. Nine reports contain material aimed at abstracting the results of these projects. The contents of the several reports are as follows:

- 1977 Grant Materials Descriptions
- 1976 Grant Materials Descriptions
- 1975 Grant Materials Descriptions
- 1974 Grant Materials Descriptions
- 1973 Grant Materials Descriptions
- 1972 Grant Materials Descriptions
- Additional 1972 Grant Materials Descriptions and 1971 Grant Materials Descriptions
- Audio-Visual Materials Descriptions
- Regional Materials Analyses for 1971-76

These abstracts should be of most interest to teachers or project directors, but because of the passage of time, probably the most useful volumes would be those providing the 1977 grant materials descriptions and the regional materials analyses.

Information on the availability of these materials can be obtained by contacting:

Mr. Walter Bogan, Director
Office of Environmental Education
Room 1100
Donohoe Building
Washington, D. C. 20202
(Phone 202-245-9231)